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UNIVERSITY OF ILLINOIS BULLETIN

ISSUED WEEKLY

VOL. XIX DECEMBER 12, 1921 No. 15

[Entered as second-class matter December 11, 1912, at the post office at Urbana, Illinois, under the Act of August 24, 1912. Acceptance for mailing at the special rate of postage provided for in section 1103, Act of October 3, 1917, authorized July 31, 1918.]

BULLETIN No. 7

BUREAU OF EDUCATIONAL RESEARCH, COLLEGE OF EDUCATION, UNIVERSITY OF ILLINOIS

Types of Learning Required of Pupils in the Seventh and Eighth Grades and in the High School

BY

WALTER S. MONROE

Director of Bureau of Educational Research

PRICE 15 CENTS

PUBLISHED BY THE UNIVERSITY OF ILLINOIS

URBANA, ILLINOIS

INTRODUCTORY STATEMENT

The study reported in this bulletin is a sub-project of a more extended investigation of the study habits of pupils. This study was made partly to secure information relative to the types of learning required of pupils and partly for the purpose of bringing certain characteristics of the learning process to the attention of teachers. This report is based upon the information secured by means of a questionnaire. This method of investigation was followed because it furnished the only feasible plan of inquiring into current practices.

A large number of teachers contributed to this study. The writer wishes to express his appreciation of their cooperation and submits this report in the hope that it will reward them for the time and effort invested in the project.

WALTER S. MONROE, *Director.*

Types of Learning Required of Pupils in the Seventh and Eighth Grades and in the High School

Nature of the learning process. Our plan of education requires that the pupil in the upper grades of the elementary school and in the high school spend a large share of his time in studying textbooks. In making an assignment, the teacher directs the pupil to study certain pages in the basic text and, in some cases, to supplement this by the study of certain references. In the preparation of these assignments the pupil learns. In considering the nature of the learning process, it is necessary to recognize that all assignments do not call for the same kind of mental activity. This is true even when we limit our consideration to assignments that call for study in which silent reading is the central activity. For example, one type of mental activity is required in memorizing a poem, another type in studying a theorem in geometry. The preparation of a lesson in history requires a different mental activity.

The type of learning should be specified in the assignment. A good assignment should indicate to the pupil the kind of study in which he is expected to engage as well as the pages of the textbook which he is to study. A good assignment includes a number of other things, but the pupil should not be left to his own resources to determine the procedure which he shall follow in the preparation of his lesson. It is, therefore, pertinent that we inquire concerning the types of study or learning required of pupils in the various subjects taught in the seventh and eighth grades and in the high school.

The problem of this investigation. The problem of this investigation is to ascertain, by means of a questionnaire submitted to teachers, the major types of textbook study required of pupils in the following school subjects: (1) geography, (2) history and civics, (3) literature, (4) physics, (5) chemistry, (6) physiology, (7) biology, (8) agriculture, (9) arithmetic, (10) algebra, (11) geometry.

Source of data. On September 29, 1921, a circular letter was addressed to the city superintendents and principals of high schools in Illinois, asking them to bring to the attention of their teachers the general plans of "an investigation of the study habits of high school pupils." They were asked to send to the Director of the Bureau of Educational Research the names of those teachers in the seventh and eighth grades and in the high school who were willing to

cooperate in this investigation. The questionnaire, on which this report is based, was sent only to those teachers whose names were secured in this way. About 800 copies were sent out. At the time this report was written only 317 questionnaires had been returned. In several cases a note accompanied the blank, saying that it represented the consensus of opinion of several teachers. Consequently, this report may be thought of as representing the consensus of opinion of more than 317 teachers. The teachers to whom the questionnaires were addressed were directed to answer the questions for only the school subjects which they were then teaching or had taught.

Basis of analysis of types of learning. In order to provide a uniform basis upon which teachers might state the types of learning required in these school subjects, it was necessary to analyze the learning process and to identify the most significant types of learning. This analysis was based on the products or outcomes of the learning process. Learning is a productive activity. As a result of engaging in study the pupil produces something. This may be simply ideas stored up in his mind or it may be a written record, such as a summary or an outline. We may assume that to a classification of outcomes there is a corresponding classification of types of learning. For example, one outcome of study is the production of a summary of the material studied. This requires a definite type of learning. It is entirely different from the type of learning required when the outcome is the memorization of the material studied.

The analysis presented in the following pages recognizes twelve outcomes or types of learning. The analysis was intentionally restricted to textbook study in which reading is the central activity. This eliminates most of the study in the field of spelling and the learning which the pupil does in connection with working examples in arithmetic or algebra. This limitation was made not because the other types of learning are not important but because it was felt desirable to confine this investigation to the types of learning in which reading is the central activity.

Furthermore, indirect or generalized outcomes of study were not included. These outcomes are not the products of studying a particular assignment but are, rather, built up over a long period of study and their realization occurs as a by-product of the production of direct or specific outcomes. Included in these generalized outcomes are:

1. Acquisition of more effective methods of thinking and reasoning.
2. Interest in and appreciation for a given field of study.
3. Acquisition of more effective modes of expression.

Types of learning in textbook study. In the list of outcomes of textbook study given below, there is some overlapping. Furthermore, it must be recognized that two or more of these outcomes may be produced simultaneously. However, it has seemed wise to recognize the distinctions implied by this list for the purpose of analyzing the process of study.

I. Comprehension of material read plus memorization so that it can be reproduced.

This reproduction need not be verbatim. It may be given in the pupil's own words, but it should include most of the minor ideas as well as the central ones. This reproduction may be given in the form of "free composition," as in the case when the pupil is simply directed *to tell* what he has read. As a special case, the reproduction may take the form of "answer composition" in which the pupil is asked specific questions which he answers in terms of what he has studied.

II. With the text at hand preparation of a summary which contains the central ideas of the assignment studied.

In this summary the central ideas should be given but the supporting details are not essential. Neither is it expected that the relative importance of the central ideas be indicated. It is not expected that this summary will be given in outline form, which is recognized as a different outcome.

III. With the text at hand preparation of an outline which gives the principal points and supporting details arranged to show order of relative importance and relations to each other.

This outcome overlaps the preparation of a summary. An outline may be considered a summary but a summary is not an outline. There are also differences other than those of form.

IV. Obtaining information for the purpose of solving problems, or answering questions.

In the production of this outcome the pupil has the ques-

tions or problems before him as he studies. He is getting information for specific purposes. The problems or questions with which he is dealing may vary widely with reference to scope. The required answer may be a single fact or it may involve the preparation of a well organized report covering several pages.

V. Extension of one's range of general information by reading widely material directly related to a given subject.

This outcome is general and indefinite. It is difficult to define in explicit terms. The information which the pupil acquires may not be very precise and so far as this outcome is concerned it need not be well organized, although it relates to some general topic.

VI. Discovery of collateral or illustrative material for topics or problems under discussion.

This type of outcome is closely related to and overlaps somewhat with V. It is, however, believed that a distinction is worth while. The pupil's purpose is somewhat different when he is looking for collateral or illustrative material rather than information to use in the solving of a problem.

VII. Enlargement of vocabulary.

Vocabulary may be enlarged in two ways. One may become acquainted in a general way with new words. Such acquaintance with words is sufficient for a great deal of general reading. Another way in which a vocabulary may be enlarged is by the determination of the technical or precise meaning of the words peculiar to a given subject. In most school subjects there are some words which have a meaning which is peculiar to that subject. These words may occur in general reading or in other subjects with a different meaning or they may be words which are found only in the field of the one subject. This outcome overlaps a number of the other outcomes enumerated here; or perhaps it is better to say that it is produced simultaneously with other outcomes. It is, however, possible to think of pupils studying primarily for this purpose.

VIII. Appreciation of the significance of each word used in a concisely expressed statement or principle.

This type of outcome results from the intensive study of an assignment with reference to the implications of all words contained within it in richness of meaning or emphasis.

IX. A clear comprehension of the essential conditions of a problem which is to be solved.

This is essentially understanding what is given and what is to be found or done in the solving of a problem.

X. Discovery of new or supplementary problems related to the topic being studied.

In the production of this outcome the pupil is maintaining a critical or questioning attitude. The discovery of new or supplementary problems may grow out of a comparison of a statement by one author with a statement by another or out of the comparison of the assignment with the pupil's experience.

XI. Drawing valid conclusions from given data or statements.

A special case of this occurs in the determination of the validity of statements or inferences. In this case the given statements or inferences are compared with other statements or with one's general store of information and a conclusion is drawn. This is essentially nothing more than drawing valid conclusions from the data or statements at hand.

XII. Following directions with accuracy and reasonable speed.

This outcome is produced only when the assignment to be studied consists of directions to be followed.

The questionnaire. A copy of the exposition of the twelve types of learning which we have just given accompanied the questionnaire. The teachers were directed to become familiar with the twelve types of learning before they attempted to answer the questions. The questionnaire is reproduced on page 8:

BUREAU OF EDUCATIONAL RESEARCH—QUESTIONNAIRE NO. I
TYPES OF TEXTBOOK STUDY

Name_____ Address_____

School Subject_____ School Grade_____

Below we list a number of school subjects in which textbook study is required. Several school subjects are not included because they appear to require peculiar types of study. Answer the following questions *only for the subjects which you are now teaching or have taught.* If you have never taught any of the subjects included in the list below write in the name of a subject which you have taught and answer the questions with reference to it.

1. What are the *major* types of textbook study which you require of your pupils in the following subjects?

Answer this question in terms of the outcomes enumerated above. Designate the types of study by means of the numbers assigned to the outcomes above. Give these numbers in what you consider to be the order of importance of the types of textbook study for this school subject. Give the most important first. It is recognized that two or more types of textbook study may be required in a single subject:

SUBJECT	TYPES OF STUDY	SUBJECT	TYPES OF STUDY
Geography		Biology	
History and Civics		Agriculture	
Literature		Arithmetic	
Physics		Algebra	
Chemistry		Geometry	
Physiology			

NOTE: Biology is intended to include botany and zoology even when they are taught as separate subjects. All sciences are intended to include the study of both the text and the laboratory manual in case one is used. In the case of arithmetic, algebra, and geometry it is our intention to include only those phases of the subject which require the study of the text.

2. Are there other significant outcomes of textbook study in which reading is the central activity that should be added to the list of twelve which we have given?_____If so, what are they?_____

_____

3. In your judgment which of the twelve types of study do pupils find most difficult? (Give your answers in order of importance, giving the most difficult first.) _____

_____

_____

4. What types of study offer the greatest difficulty to the teacher in training pupils in methods of study?_____

_____

_____

Limitations of replies to questionnaire. In interpreting the summaries of the replies to the questionnaire certain limitations must be kept in mind. In the first place, the analysis of the learning process and the recognition of different types of learning was probably unfamiliar to many, if not to all, of the teachers who answered the questionnaire. The brief exposition of this analysis and the description of the types of learning were, doubtless, not sufficient in many cases to give the teachers an adequate understanding of the twelve types of learning. From letters which occasionally accompanied the questionnaires and from information secured in other ways, it appears that the questions were answered with a great deal of care. In several instances, where a number of teachers from the same school were cooperating, they met together and discussed the questions before answering them.

The questions were asked with reference to present practice in the schools. However, the answers must be thought of merely as opinions of the teachers; for the present practice is, doubtless, a reflection of their judgment concerning what should be asked of their pupils. The summaries presented in the following tables should, therefore, be thought of as representing the concensus of the opinions of teachers in regard to present practice.

Types of learning required by pupils in certain school subjects. The replies to the first question are summarized in Table I, which is to be read as follows: Reports were secured from 65 teachers of geography. Of this number, 56 mentioned Type I as a major type of textbook study required in geography; 27 mentioned Type II; 37 mentioned Type III; and so forth. Table II is derived from Table I by calculating the percent of teachers who mentioned each type of study. These percents are given only for the subjects appearing on the questionnaire blank. It appears that teachers had considerable difficulty in defining major types of textbook study. Some were inclined to mention practically all types of textbook study as being major types while others restricted their answers to one or two types only. The frequencies of the number of major types mentioned are summarized in Table III. Of the 65 teachers reporting for geography, only one restricted his answer to one major type; seven mentioned two major types; 24 mentioned three major types; and so on. The number of types most frequently mentioned by a teacher is three. Four teachers mentioned all twelve types.

TABLE I. FREQUENCY OF MENTION OF TYPES OF STUDY IN VARIOUS SCHOOL SUBJECTS

SUBJECTS	Number of Teachers	TYPES OF STUDY												TOTAL
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Geography	65	56	27	31	35	37	33	10		7	11	16	13	276
History and Civics	103	80	45	57	44	65	45	16	4	14	25	32	9	436
Literature	100	88	53	47	34	50	23	87	50	6	14	18	17	487
Physics	47	30	8	9	30	9	11	7	13	22	14	36	25	214
Chemistry	34	24	8	7	22	10	6	6	8	13	13	24	21	162
Physiology	49	40	17	11	17	12	9	16	2	6	12	14	14	170
Biology	44	34	15	10	21	20	15	13	3	5	12	17	20	185
Agriculture	29	17	7	8	22	10	9		3	8	11	13	9	117
Arithmetic	65	12	3	3	40	1	4	8	14	56	26	22	36	225
Algebra	66	20	3		44	1	5	7	25	58	21	31	40	225
Geometry	60	25	3	1	33		2	11	20	50	26	45	34	250
Industrial Education	4	1			2	1				1	1		1	7
Bookkeeping and Shorthand	4	1	1		2			2	2	3	1	2	4	18
Manual Training	4	1			2	2	1	2		2			2	12
Latin	17	14	2	2	8	3	1	14	7	4	4	5	6	70
Music	1	1						1	1				1	4
Grammar, Rhetoric, and Composition	8	5	1	1	1		1	1	1	1			3	15
General Science	6	3			4	1	2	1	1	2	2	6	5	27
Spelling	1							1						1
French	4	3	3		1	4		3	1					15
Household Arts	13	10	6	3	9	4	4	6	1	7	4	5	12	71
Penmanship	2												2	2
Trigonometry	1	1			1					1		1	1	5
Economics	3	1		2	2	3		1		2	3	1		15
Total	729	467	202	192	377	233	171	213	156	268	200	288	275	3042

TABLE II. PER CENT OF TEACHERS MENTIONING EACH TYPE OF STUDY

SUBJECTS	Number of Teachers	TYPES OF STUDY											
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Geography	65	86	42	48	54	57	51	15		11	17	25	20
History and Civics	103	78	44	55	43	63	44	16	4	14	24	31	9
Literature	100	88	53	47	34	50	23	87	50	6	14	18	17
Physics	47	64	17	19	64	19	23	15	28	47	30	77	53
Chemistry	32	75	25	22	66	31	19	19	25	41	41	75	66
Physiology	48	83	35	23	35	25	19	33	4	13	25	29	29
Biology	44	77	34	23	48	45	34	30	7	11	27	39	45
Agriculture	27	63	26	30	81	37	33		11	30	41	48	33
Arithmetic	67	18	4	4	60	1	5	12	21	84	39	33	54
Algebra	68	30	4		65	1	7	10	37	85	31	46	59
Geometry	61	41	5	2	54		3	18	33	82	43	73	56

TABLE III. NUMBER OF MAJOR TYPES OF TEXTBOOK STUDY

SUBJECTS	NUMBER OF MAJOR TYPES MENTIONED												Number of Teachers
	1	2	3	4	5	6	7	8	9	10	11	12	
Geography	1	7	24	13	7	7	3		1	2			65
History and Civics	2	11	20	22	22	13	3	2	4	1	1	2	103
Literature	3	3	22	17	21	20	4	5	2		2	1	100
Physics		5	14	9	6	5	4	2	1	1			47
Chemistry		2	6	6	8	2	3	3	1	1			32
Physiology	5	9	15	4	7	5	1	2					48
Biology	1	4	10	12	5	7	5						44
Agriculture	2	3	8	7	2		2		2	1			27
Arithmetic	8	10	20	15	6	3	4	1					67
Algebra	4	11	20	13	7	5	8						68
Geometry	1	10	14	13	7	7	7	1		1			61
Industrial Education		2	1		1								4
Bookkeeping and Shorthand	2			1	1								4
Manual Training	1	1	1	1									4
Latin	1	3	4	2	3	2	1					1	17
Music				1									1
Grammar and Rhetoric	1	2		2	1	1							7
General Science		1		3		1	1						6
Spelling	1												1
French			1			3							4
Household Arts		2	2	1	1	3	2	1	1				13
Penmanship	2												2
Trigonometry					1								1
Economics			1	1				1					3
Total	35	86	183	143	106	84	48	18	12	7	3	4	729

In interpreting Tables I and II, it is necessary to keep in mind the above limitations. These tables give a summary of the opinions of teachers concerning the types of study which are most important in the several subjects. Since these types of textbook study were defined in terms of outcomes, it follows that we have, also, an indication of the types of outcomes which teachers consider most important. It would be profitable to compare these outcomes with statements of educational objectives. It is not unlikely that, if teachers were asked concerning the outcomes which they considered most important in these subjects, a different consensus of opinion would be secured. The following observations may be made with reference to these three tables. These statements may be thought of as tentative conclusions:

1. In the study of a school subject a pupil is required to engage in several types of learning. In other words, in a given school subject, study generally means the doing of several things rather than of a single thing.

2. Table III indicates a variety of opinion concerning the number of major types of study required of pupils in the different subjects. Some teachers appear to be restricting the learning process to one or two types, while others are requiring many types of learning.

3. The most frequent types of learning are: I, "comprehension of material read plus memorization so that it can be reproduced"; IV, "obtaining information for the purpose of solving problems or answering questions"; XI, "drawing valid conclusions from given data or statements"; IX, "a clear comprehension of the essential conditions of a problem which is to be solved". The least frequently mentioned is VIII, "appreciation of the significance of each word used in a concisely expressed statement or principle".

4. No type of study is mentioned by 100 percent of the teachers. This fact, together with the fact that all types of learning were reported for a number of school subjects, indicates that some teachers are not in agreement with the majority with respect to the types of learning required of their pupils.

5. The most frequently mentioned types of learning vary for the different subjects. For example, in Literature, 88 percent mention Type I and 87 percent Type VII. In Physics, 77 percent mention Type XI and 64 percent Types I and IV. In Arithmetic, the most frequently mentioned is Type IX, which was given by 84 percent. Type IV was mentioned by 60 percent and Type XII by 54 percent.

TABLE IV. RELATIVE DIFFICULTY OF TYPES OF LEARNING FROM THE STANDPOINT OF THE PUPIL

	TYPES OF LEARNING												
RANK	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	TOTAL
1	44	14	37	19	9	14	4	21	39	24	55	16	296
2	8	22	21	24	14	19	9	39	35	29	40	20	280
3	11	7	15	20	7	13	10	19	39	22	42	28	233
4	5	5	13	12	4	7	7	16	16	14	20	21	140
5	5	1	5	1	1	13	4	9	4	9	13	8	73
6	1	3	1	7	3	2	1	6	1	4	3	6	38
7	2		1	2	5	3	5	1	1	2	2	4	28
8		2	2	5	4	2	2		1		2	2	22
9	4	1		4	1	2	3	3				1	19
10	1	4	5	1	2	1	2		1			1	18
11	4	5	1		3	1	2	1		1			18
12	3	1		1	1		3	1	1	2		4	17

TABLE V. RELATIVE DIFFICULTY OF TYPES OF LEARNING FROM THE STANDPOINT OF INSTRUCTION

TYPES OF LEARNING												
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	TOTAL
63	48	67	71	60	63	51	87	120	95	130	87	942

6. The fact that different subjects demand different types of learning makes it necessary that the teacher of each subject give training to the pupils in the type of learning required by that subject.

The relative difficulty of types of learning from the standpoint of the pupil. The answers to Question 3 have been summarized in Table IV. Only 296 replies to this question were received. Type I was mentioned by 44 teachers as being the most difficult type of learning from the standpoint of the pupil. Type II was mentioned by 14 teachers; Type III, by 37 teachers; and so on. The totals in the column at the right of the table show that 16 teachers mentioned only one type of learning (296-280). Only 73 teachers mentioned five or more types. Out of 296, 17 mentioned all twelve types. The marked diversity of opinion with reference to the relative difficulty of these twelve types of learning is probably due, in part, to the fact that these teachers were answering with reference to different school subjects. It was also doubtless due, in part, to the fact that the teachers were not familiar with this analysis of the learning process. However, this table should give some indication of the relative difficulty of these types of learning. It is interesting to note that Type I, "comprehension of material read plus memorization", is indicated as being the second most difficult type of learning. It is exceeded in difficulty, according to the judgment of these teachers, only by Type XI, "drawing valid conclusions from given data or statements". Type V, "extension of one's range of general information by reading widely material directly related to a given subject", is indicated as being the least difficult.

The relative difficulty of types of learning with reference to instruction. The answers to Question 4 are summarized in Table V. Question 4 asked concerning the difficulty of training pupils in these twelve types of learning. The teachers were asked to indicate the types of study which "offer the greatest difficulty to the teacher in training pupils in methods of study". Most teachers mentioned two or more types of study. In Table V, no distinction is made with reference to the relative difficulty of the types mentioned by the teachers. Type XI, "drawing valid conclusions from given data or statements", is judged to be most difficult. It is also considered to be most difficult from the standpoint of the pupil.

Additional types of learning suggested. Question 2 asked the teachers to indicate any significant outcomes of textbook study that should be added to the list which defines the twelve types of learning. Only 68 teachers suggested additional outcomes. Most of the suggestions were with reference to generalized outcomes, which we excluded from our analysis. Development of character, training in concentration, and development of appreciation for a given field of study were mentioned as additional generalized outcomes.

A number of outcomes of study not based upon silent reading were also mentioned. This investigation was definitely restricted to the types of study in which reading is the central activity. Therefore, these suggestions do not apply to our analysis, although they do pertain to important types of study.

"The organization of ideas gained from study with results of other study and with ideas gained from experience" was mentioned by several teachers. This is, undoubtedly, an outcome of study and defines an important type of study. Somewhat the same idea was suggested by a few teachers under the head of "application of ideas and principles". "Participation in and understanding of the experiences of others" was mentioned as an outcome of study by one teacher. Another teacher mentioned "making out questions based upon assignments studied". These suggestions for additional types of study, even though relatively few, indicate that some modifications should, perhaps, be made of the analysis presented to the teachers.

EXCHANGE
SEP 20 '22

UNIVERSITY OF ILLINOIS BULLETIN

ISSUED WEEKLY

Vol. XIX JANUARY 30, 1922 No. 22

[Entered as second-class matter December 11, 1912, at the post office at Urbana, Illinois, under the Act of August 24, 1912. Acceptance for mailing at the special rate of postage provided for in section 1103, Act of October 3, 1917, authorized July 31, 1918.]

BULLETIN NO. 8

BUREAU OF EDUCATIONAL RESEARCH
COLLEGE OF EDUCATION

A CRITICAL STUDY OF CERTAIN SILENT READING TESTS

By
WALTER S. MONROE, DIRECTOR

UNIVERSITY OF ILLINOIS
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